ENGINEERING BULLETIN

HIGHWAY EXTENSION AND RESEARCH PROJECT FOR INDIANA COUNTIES

Inventory of Indiana County Bridges

PURDUE UNIVERSITY—ENGINEERING EXPERIMENT STATION

in cooperation with

THE COUNTY COMMISSIONERS OF INDIANA

COUNTY HIGHWAY SERIES—No. 10

JANUARY 1969

HIGHWAY EXTENSION AND RESEARCH PROJECT FOR INDIANA COUNTIES

The Highway Extension and Research Project for Indiana Counties (HERPIC) was organized at Purdue in 1959 to implement legislation by the Indiana General Assembly authorizing programs of extension and research for county highway departments throughout the state.

The financial support for these programs of extension and research is derived from ⅛ of 1% of the funds made available to the 92 counties from gas taxes and license fees collected by the State of Indiana. The legislation by the General Assembly also designated Purdue University through its Engineering Experiment Station and School of Civil Engineering to develop and coordinate these programs.

The HERPIC program of extension and research provides for the preparation of manuals and bulletins setting forth recommended procedures and for regional workshop conferences with county road officials throughout the state to review typical road problems for their area. All of these activities are designed to assist and guide county highway officials in their problems of management, planning, design, and operation of county highway departments.

The HERPIC project operates as a cooperative effort between the county commissioners of Indiana and Purdue University. The program of extension and research is guided and approved by a 12-man advisory board, consisting of six county commissioners from over the state and six members from the staff of the Purdue's School of Civil Engineering. The current membership of the HERPIC Advisory Board is listed below.

Jean Hittle
Purdue University
Secretary to the Board

COUNTY HIGHWAY SERIES

inventory of indiana county bridges

by

Jean E. Hittle

Highway Engineer

Engineering Experiment Station

purdue university • lafayette, ind.

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Inventory of Indiana County Bridges

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INTRODUCTION

County bridges represent a mounting problem for county road officials in Indiana. Each year the explosion of population, automobiles, and suburban living generate greater demands for all types of county road services; each year traffic loads on bridges are heavier, wider, and more frequent; each year our old bridges are less adequate through age and obsolescence; each year construction costs increase over previous levels. In short, with each passing year, the county bridge problem becomes more critical and more difficult to solve.

County bridges are by no means a new problem to county road officials. Historically, bridges have always represented a necessary but costly part of highway development and operation. In Indiana, as with most other states in the Midwest, the majority of the existing county bridges were built around the turn of the cenutry to complete the develoment of the early county road systems. While these early bridges were adequate for the traffic needs of the times, they are completely inadequate for today's farm equipment, milk trucks, fuel trucks, grain trucks, school buses, and construction equipment.

The purpose of this report is to bring county bridge needs into focus—state-wide and county-by-county—through a detailed computerized inventory listing of all existing county bridges. Each county's inventory listing has been further summarized as to the number of bridges by length and width categories, along with an estimated replacement cost. This inventory report thus gives a measure and dimension to the county bridge problem. Hopefully this information will assist local road officials, legislative study groups, and members of the General Assembly in weighing alternate solutions to the financing of county bridge programs.

This inventory report points out that state-wide, Indiana counties have more than 14,000 bridges (structures over 20 feet in length).

Of these, more than 10,000 (or about 75 percent) are one-lane bridges. In addition there are thousands of old, narrow culvert structures less than 20 feet in length. State-wide cost estimates for replacing the one-lane bridges alone, amount to more than $600 million. The counties have traditionally used a cumulative bridge levy (county taxation) as the principal source of revenue for construction and repair of county bridges. Therefore, the counties having a great number of bridges and a low assessed valuation face a real challenge.

Using the maximum cumulative bridge level permissible (20 cents) and current assessed valuations, some 25 counties will require more than 100 years to replace the one-lane bridges alone; in three extreme cases, more than 200 years will be required. Thus, the overwhelming question county commissioners face in the matter of bridges is available funds to meet the needs.

HERPIC BULLETIN—PLANNING AND FINANCING COUNTY BRIDGE PROGRAMS

The county bridge inventory report supplements an earlier HERPIC bulletin, "Planning and Financing County Bridge Programs," Purdue Univeristy, Engineering Experiment Station, County Highway Series—No. 6, March 1963. This bulletin was published and widely distributed to county road officials throughout the state.

The earlier bulletin reviews several areas of information on county bridge programs including: (1) the authority and jurisdiction over county bridges, (2) the various sources of funds for construction and repair of county bridges, and (3) the fiscal process of making appropriations and expenditures for construction and repair of bridges. In addition, the bulletin outlines methods for county-wide bridge inventory, condition and priority rating of bridges, and formulating a county-wide program for bridge improvements.

There have been no major changes in the applicable laws or statutes since the bulletin was published. Therefore, the information and recommendations set forth in HERPIC Bulletin No. 6 should be given the fullest possible use and application. With the county bridge inventory listing and summary in hand, county commissioners should be able to arouse broad community interest and support for a vigorous county bridge improvement program. Moreover, with the inventory completed, most counties should be able to proceed directly with the condition and priority rating and the formulation of a comprehensive bridge improvement program.

COUNTY BRIDGE INVENTORY LISTING

The county bridge inventory reports (92) have been compiled by a computer program designed for this particular purpose. Each county report starts with a title page, followed by a legend page. Next comes the inventory listing of county bridges; the report ends with a sheet that summarizes the bridges by width, length, and estimated cost of replacement. It should be noted that each report has been paged with the total pages indicated. While the individual county report is mostly self-explanatory, there are a few items that warrant review and emphasis.

Inventory Data used to compile the county bridge inventory reports was made available by the Indiana State Highway Commission. The field data on county bridges was collected as a part of a state-wide inventory of highways, roads, and streets conducted by the Indiana State Highway Commission in cooperation with the Bureau of Public Roads. Without the original data this inventory listing and summary report would not be possible.

Date Field Inventory Completed is indicated on each county report; these dates range from 1959 through 1964. County road officials should take special note of this date for their particular county. It is recommended that county road officials up-date the inventory listing with information on any revisions or new bridges constructed after the date shown.

Bridges Included in Inventory are bridges in unincorporated areas and on the county highway system plus bridges in cities and towns not on a state highway. The city bridges (not on a state highway) were included because these structures, with few exceptions, have been constructed and maintained as a county responsibility. It should also be pointed out that the inventory listing includes only those structures 20 feet or more in length. Grade separations (overpass or underpass structures) *are not included* in the inventory; likewise, culvert structures (less than 20 feet in length) *are not included.*

County-Line Bridges (also state-line) on all sides of the county are generally included in each county inventory report. Thus, the inventory information is duplicated in the adjacent county. Administrative responsibility for a particular bridge structure is of course, a matter of mutual agreement between the board of commissioners of the adjacent counties involved.

Inventory Items Listed include some 13 items that identify each bridge by number, location, stream crossing, type, dimension, and other

physical characteristics. The following are brief comments on the column headings of the inventory listing.*

COUNTY BRIDGE NO.
INVENTORY ROUTE NO.
KEY MAP LOCATION
STREAM NAME

These four items identify the bridge structure by number and location. This reference information fixes the location on the County Road Inventory Key Map included with the bridge inventory report.

FUNCTIONAL CLASSIFICATION
CONDITION RATNG

These two column headings were provided for the use and convenience of county road officials at some future date. The functional classification refers to the importance rating assigned to the particular county road or inventory route on which the bridge is located. The condition rating refers to a numerical index of condition of the bridge structure based on field inspection and analysis. Both items of information should be completed by the county highway engineer.

BRDGE TYPE
SUPERSTRUCTURE MATERIAL
SUBSTRUCTURAL MATERIAL

These items are indicated by alpha designations set forth in the legend of bridge types and structural materials.

LENGTH (FT)
HORIZONTAL CLEARANCE (FT)
VERTICAL CLEARANCE (FT)
STREAM HEIGHT (FT)
NO. OF SPANS

These five items of information describe the physical dimensions and characteristics of each bridge srtucture. Where the bridge facility is made up of two or more bridge types, the total length of the bridge crossing is the sum of all entries with the same COUNTY BRIDGE NO. Entries for VERTICAL CLEARANCE (FT) are shown only for structures having overhead cross-bracing, i.e., through truss bridges. The STREAM HEIGHT (FT) is the vertical distance from low steel on the structure to the normal stream level.

* See also a sample county report and road inventory key map for Blackford County, Indiana included as an appendix to this report.

ESTIMATED SAFE LOAD (T)

This item is *only advisory information*—the value indicated is only a visual estimate made at the time of field inventory. A condition inspection and safe load rating should be made annually by county highway engineer.

Inventory Listing by Horizontal Clearance provides county commissioners with a convenient, ready-made planning tool. ISHC traffic engineering standards classify bridges for horizontal clearance as follows:

ONE-LANE—Less than 18 ft.
NARROW—18 ft. to 22 ft.
ADEQUATE—More than 22 ft.

Therefore, the computer program for the inventory of county bridges was designed for listing the county bridges by these three categories. This grouping of county bridges will make it easier for commissioners to concentrate on replacing the one-lane and narrow bridges.

COUNTY BRIDGE INVENTORY SUMMARY

The computerized report for each county ends with an inventory summary of all bridges in that particular county. The computer program counted the number of bridges and summed up their combined length for nine different width-length combinations. The width and length groupings are as follows:

Length Group	Horizontal Clearance
Less than 50 ft.	Less than 18 ft.—one lane
50 ft. to 100 ft.	18 ft. to 22 ft.—narrow
More than 100 ft.	More than 22 ft.—adequate

The summary also presents the number of bridges and their combined length for the group totals of each category of length and width; likewise a grand total for all bridges in the county and their combined length. This information will be extremely useful to county commissioners as a general overall measure of their bridge replacement problems.

ESTIMATING BRIDGE REPLACEMENT COSTS

With the bridges for each county summarized by width and length, an estimate of replacement cost was the next logical step. This information is also presented on the summary sheet that ends the county report. However, there are certain limitations to the cost estimates that should be emphasized, as follows:

1. First, the replacement costs are truly estimates; they are presented solely to give a measure of the total financial resources necessary to replace all of the existing county bridges.
2. The replacement costs are applied against all existing county bridges, irrespective of age or condition. It is assumed that eventually all bridges, even new ones, will have to be replaced.
3. The estimated replacement costs are based on an average of a number of typical county FAS projects. The cost figures used will therefore do a reasonably good job of estimating a total county program; the cost figures *are not* recommended for estimating the cost of a specific project.
4. The estimated replacement cost is based on the minimum FAS requirements for two-lane bridges on rural highways with 400 VPD or less. The actual unit cost figure is an *average* price for bridge structures awarded to contract by the Indiana State Highway Commission on typical county FAS projects for calendar year 1967, plus average costs for engineering plans, specifications, and inspection.
5. The estimated replacement cost *does not* include any factors to cover increases in construction cost that may be experienced in the future; they also *do not* take into account any construction cost differential that frequently prevails in metropolitan and industrialized areas.

The following is a brief description of the several factors used to build up the estimated replacement cost, along with average values for the past five years.

Length Factor is the ratio of the new bridge length to old bridge length. New bridges are usually longer than the old bridge they replace because of improved alignment of the new bridge and because a modern economic bridge design favors a "spill-thru" opening over the massive abutment openings that were commonly used on early bridges. A factor of 1.40 was used to compute the estimated replacement length.

The five-year averages are as follows:

Length Factor = Ratio: New Length/Old Length

Year	No. Proj.	Avg. Ratio
1963	18	1.41
1964	22	1.43
1965	16	1.37
1966	16	1.39
1967	14	1.23

Five-year average = 1.376; use 1.40

Structure Costs were separated from the total project costs and converted to a cost per square foot of bridge structure, using outside dimensions. The five-year averages that follow reflect a cost-increase trend similar to that reported by the overall construction industry. Therefore, the 1967 average cost of $15.86 per square foot was used in the computations.

Structure Costs—Dollars per sq ft

Year	No. Proj.	Avg.
1963	32	$12.56/sq ft
1964	36	13.26
1965	26	12.85
1966	18	14.16
1967	17	15.86

Five-year average = $13.47; use 1967 average cost of $15.86 per square foot

Project Cost Factor is the ratio of total project costs to the structure costs for typical FAS county bridge projects. This factor was applied against the average structure cost so that an average cost for roadway approaches could be included. A factor of 1.44 was used in these computations. The five-year averages are as follows:

Project Cost Factor = Ratio: Total Cost/Structure Cost

Year	Avg. Ratio	No. Proj.
1963	23	1.41
1964	28	1.42
1965	23	1.37
1966	18	1.41
1967	19	1.48

Five-year average = 1.436; say 1.44

Engineering Factor was set at 15 percent on the basis of typical fees being charged for engineering work. It should be pointed out that this factor will vary from job to job. The 15 percent factor used here is intended to include design plans and specifications, plus construction engineering and inspection.

Cost Summary. A figure of $755 per lineal foot of new bridge was used to compute the estimated replacement cost in the county reports. It is believed this is a realistic average for computing the counties' financial needs in a total county bridge program. However, this figure is subject to the limitations that have been previously outlined. The following computations demonstrate how this figure of $755 per lineal foot was built up.

Cost Summary Computations

$ 15.86	per sq ft—avg. structure costs 1967
x28.833	ft—min. design-width normally used on FAS projects with 400 VPD or less
$457.29	per lineal foot of structure. (bridge only)
x1.44	project cost factor
$658.50	per lineal foot of structure (total project)
x1.15	engineering factor including, plans, specifications, and inspection.
$757.27	

say $755 per lineal foot of bridge.

STATE-WIDE COUNTY BRIDGE REVIEW

Indiana's 92 counties have 14,046 bridges having a combined length of 788,548 feet or over 149 miles. The combined estimated replacement length is 1,103,967 feet or over 209 miles with an estimate replacement cost of over $833 million. Approximately 75 percent of the counties bridges are one-lane bridges of less than 18 feet horizontal clearance and approximately 65 percent are less than 50 feet in length.

While many different statistical comparisons are possible, the reader should refer to:

Table A—Summary of County Highway Bridges (State-Wide Grand Totals) and

Table B—Inventory of County Bridges (State-Wide County Recap).

These two tables summarize the most important items of information for state-wide comparisons.

The state-wide county recap of number of bridges and their estimated replacement cost shown in Table B, has also been presented in map form in Figures 1 and 2. This gives the information a map meaning and a geographic orientation. As to numbers of bridges, there are some 25 counties that have 200 or more county bridges. Marion County with its dense network of roads and streets has the greatest number of bridges—328; Ohio County, the smallest county in area, also has the least number of bridges—22.

In Figure 1, it should be noted that many of the counties having great numbers of bridges also have flood plains and flood-water drain-

Table A - SUMMARY OF COUNTY HIGHWAY BRIDGES*

STATE-WIDE GRAND TOTALS 92 COUNTIES - INDIANA

RATING FOR HORIZONTAL CLEARANCE	ONE-LANE LESS THAN 18 FT		NARROW 18 FT - 24 FT		ADEQUATE MORE THAN 22 FT		STATE TOTAL	
LENGTH GROUP	NO	COMB LGTH	NO	COMB LGTH	NO	COMB LGTH	NO	COMB LGTH
LESS THAN 50 FT	6749	216973 FT	1703	52447 FT	650	20386 FT	9102	289788 FT
50 - 100 FT	2645	174590 FT	422	27893 FT	379	26111 FT	3446	228594 FT
MORE THAN 100 FT	1104	178059 FT	152	36005 FT	242	56102 FT	1498	270166 FT
GROUP TOTAL	10498	569622 FT	2277	116345 FT	1271	102561 FT	14046	788548 FT
ESTIMATED REPLACEMENT LENGTH** = 1.40 X EXIST. LGTH.		797470 FT		162883 FT		143613 FT		1103967 FT
ESTIMATED REPLACEMENT COST*** = $755.00/LIN FT		$ 602086850.00		$ 122976665.00		$ 108427815.00		$ 833490085.00

*SUMMARY INCLUDES BRIDGES IN UNINCORPORATED AREAS AND ON THE COUNTY HIGHWAY SYSTEM. PLUS(+) CITY BRIDGES NOT ON STATE HIGHWAY SYSTEM. (GRADE SEPARATIONS NOT INCLUDED)

**ESTIMATED REPLACEMENT LENGTH BASED ON AN AVERAGE RATIO (NEW LGTH/OLD LGTH) OF 1.40 FOR TYPICAL COUNTY FAS BRIDGES.

***ESTIMATED REPLACEMENT COST/LIN FT BASED ON

(A) MINIMUM FAS REQUIREMENTS FOR BRIDGES ON RURAL HIGHWAYS -- 400 VPD OR LESS AND

(B) AVERAGE PRICES FOR BRIDGE STRUCTURES AWARDED TO CONTRACT BY ISHC ON TYPICAL COUNTY FAS PROJECTS FOR CALENDAR YEAR 1967, PLUS (+) AVERAGE COSTS FOR ROADWAY APPROACHES, PLUS (+) AVERAGE COSTS FOR ENGINEERING PLANS, SPECIFICATIONS AND INSPECTION.

age; all the counties along the lower Wabash River are examples of this condition. Drainage ditches, no doubt, add to the number of bridges, such as in Jasper, Pulaski, and White counties.

While the number of bridges in a county has a certain overall meaning, the estimated replacement costs gives a better measure of bridge problems and needs. In this respect, there are some 37 counties where the estimated replacement cost for existing county bridges is $10 million or more. Interestingly enough, this group of counties generally outline the main rivers as they course through the state. However, the

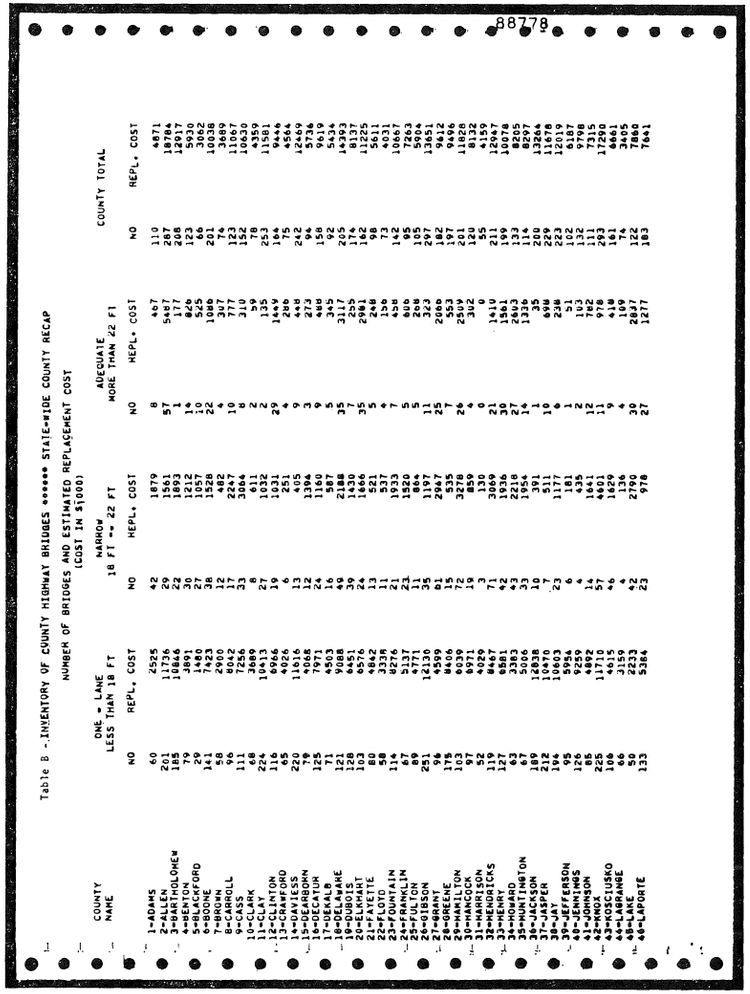

Table B - INVENTORY OF COUNTY HIGHWAY BRIDGES ****** STATE-WIDE COUNTY RECAP
NUMBER OF BRIDGES AND ESTIMATED REPLACEMENT COST
(COST IN $1000)

COUNTY NAME	ONE - LANE LESS THAN 18 FT NO	ONE - LANE LESS THAN 18 FT REPL. COST	NARROW 18 FT -< 22 FT NO	NARROW 18 FT -< 22 FT REPL. COST	ADEQUATE MORE THAN 22 FT NO	ADEQUATE MORE THAN 22 FT REPL. COST	COUNTY TOTAL NO	COUNTY TOTAL REPL. COST
1-ADAMS	60	2525	42	1879	8	487	110	4871
2-ALLEN	201	11736	29	1561	57	5487	287	18784
3-BARTHOLOMEW	185	10844	22	1893	1	177	208	12917
4-BENTON	79	3891	30	1212	14	826	123	5930
5-BLACKFORD	41	1420	27	1557	10	545	78	3522
6-BOONE	141	7450	24	1298	22	1340	187	10088
7-BROWN	58	2900	12	482	4	307	74	3689
8-CARROLL	96	8042	17	2247	10	777	123	11067
9-CASS	111	7256	33	3004	8	310	152	10630
10-CLARK	146	3689	6	511	2	159	78	4359
11-CLAY	224	10413	27	1032	29	1359	252	13561
12-CLINTON	116	6966	19	1031	29	1449	164	9446
13-CRAWFORD	65	4026	6	251	4	286	75	4564
14-DAVIESS	220	11616	13	905	9	418	242	12469
15-DEARBORN	129	7465	12	1304	3	225	144	8994
16-DECATUR	125	7971	16	1160	9	488	150	9619
17-DEKALB	71	4903	16	587	5	345	92	5434
18-DELAWARE	121	9088	49	2188	35	3117	205	14393
19-DOUGLAS	128	6455	39	1460	7	323	174	8237
20-ELKHART	103	6571	24	1466	35	2961	162	11225
21-FAYETTE	80	4842	13	521	5	248	98	5611
22-FLOYD	58	3336	11	537	4	136	73	4031
23-FOUNTAIN	114	6276	21	1933	7	458	142	10667
24-FRANKLIN	67	4771	23	1520	5	408	95	6763
25-FULTON	69	4771	11	864	5	268	105	5903
26-GIBSON	251	12130	35	1197	11	323	297	13651
27-GRANT	96	4599	81	2947	25	2066	182	9612
28-GREENE	175	8656	75	3155	7	583	257	12496
29-HAMILTON	103	6039	75	3279	26	2553	204	11870
30-HANCOCK	97	6971	19	859	4	302	120	8132
31-HARRISON	52	4029	3	130	0	0	55	4159
32-HENDRICKS	129	6887	71	3069	21	1410	221	12947
33-HENRY	127	6881	42	1806	21	1391	190	10078
34-HOWARD	63	3383	43	2218	27	2603	133	8205
35-HUNTINGTON	67	5006	33	1954	14	1336	114	8297
36-JACKSON	189	12838	10	391	1	35	200	13264
37-JASPER	212	10603	27	511	10	604	249	11718
38-JAY	104	6971	17	1177	8	238	129	8132
39-JEFFERSON	95	5954	6	181	1	51	102	6187
40-JENNINGS	126	9259	4	435	2	103	132	9798
41-JOHNSON	165	9592	14	1461	12	972	191	12025
42-KNOX	225	11710	57	4615	11	918	293	17243
43-KOSCIUSKO	106	4615	46	1629	9	418	161	6661
44-LAGRANGE	66	3159	4	136	4	109	74	3405
45-LAKE	133	6223	42	2790	20	2837	122	7860
46-LAPORTE		2284	23	978	27	1277	183	7641

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estimated replacement cost bears little or no relation to the counties' ability to generate the necessary revenue.

Traditionally, Indiana's counties have financed the repair and construction of county bridges through a cumulative bridge fund (county taxation) authorized by statute (Burns 36-3910 et seq.). If we assume that the cumulative bridge fund will continue as the major source of revenue for county bridge replacement and also assume that the counties will use the maximum permissible levy of 20 cents, then we can estimate the number of years required to replace the bridges.

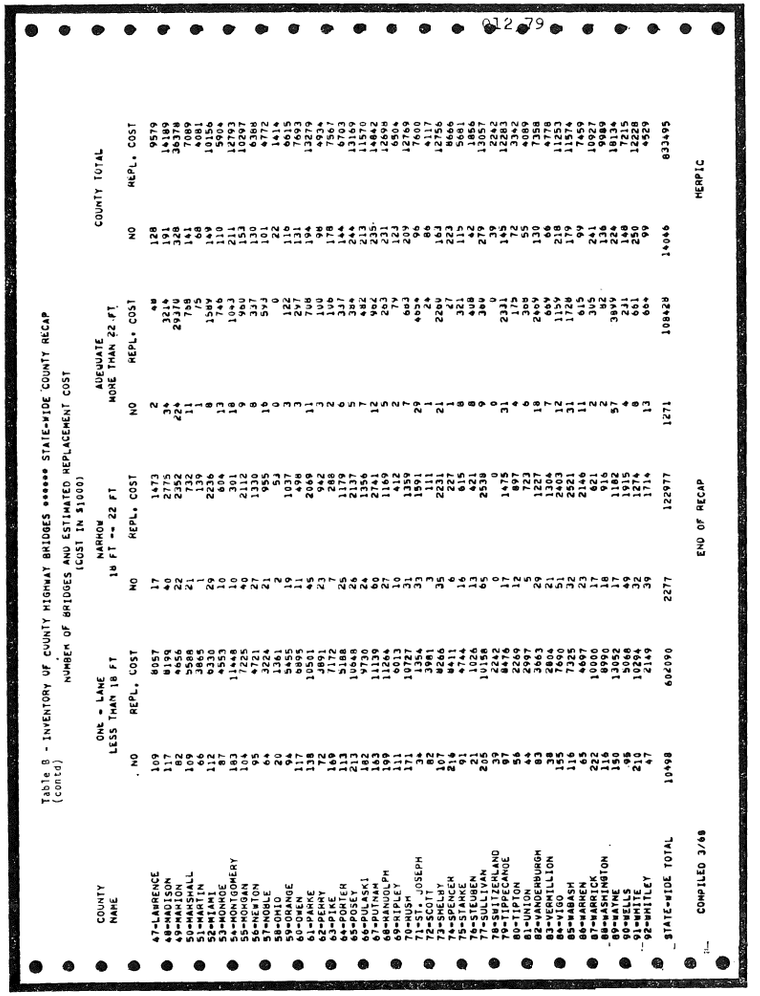


Table B - INVENTORY OF COUNTY HIGHWAY BRIDGES ****** STATE-WIDE COUNTY RECAP (cont'd)
NUMBER OF BRIDGES AND ESTIMATED REPLACEMENT COST
(COST IN $1000)

COUNTY NAME	ONE - LANE LESS THAN 18 FT NO	ONE - LANE LESS THAN 18 FT REPL. COST	NARROW 18 FT -< 22 FT NO	NARROW 18 FT -< 22 FT REPL. COST	ADEQUATE MORE THAN 22 FT NO	ADEQUATE MORE THAN 22 FT REPL. COST	COUNTY TOTAL NO	COUNTY TOTAL REPL. COST
47-LAWRENCE	109	8587	17	1473	2	98	128	9579
48-MADISON	117	8158	40	2775	34	3214	191	14189
49-MARION	82	4656	22	2352	224	29370	328	36378
50-MARSHALL	109	5588	21	732	11	759	141	7089
51-MARTIN	66	3855	1	139	1	75	68	4181
52-MONROE	122	8250	20	2206	8	1304	150	11760
53-MONTGOMERY	87	4553	10	606	13	746	110	5904
54-MONTGOMERY	183	11448	10	301	18	1043	211	12793
55-MORGAN	104	7225	40	2112	9	960	153	10297
56-NEWTON	95	4721	27	1330	8	347	130	6398
57-NOBLE	94	6224	21	953	10	595	125	7772
58-OHIO	20	1361	2	53	0	0	22	1414
59-ORANGE	94	5455	19	1037	3	122	116	6615
60-OWEN	117	8895	11	498	3	297	131	9693
61-PARKE	128	10501	45	2049	11	1756	184	14306
62-PERRY	76	4251	23	1179	5	100	104	5530
63-PIKE	169	7172	7	288	2	106	178	7567
64-PORTER	113	5188	25	1179	6	337	144	6703
65-POSEY	213	10848	26	2137	5	334	244	13319
66-PULASKI	162	9720	24	1351	7	469	193	11540
67-PUTNAM	213	11139	60	2741	12	964	285	14842
68-RANDOLPH	199	11264	27	1169	5	263	231	12696
69-RIPLEY	111	6013	10	412	2	79	123	6504
70-RUSH	171	10727	31	1393	7	693	209	12760
71-ST. JOSEPH	82	3981	3	111	1	24	86	4117
72-SCOTT	107	8266	35	2231	21	2290	164	12756
73-SHELBY	216	14111	6	227	1	27	223	14365
74-SPENCER	91	4744	16	1115	8	327	115	5886
75-STEUBEN	21	1026	13	421	8	408	42	1856
76-STEUBEN	205	10158	65	2538	9	360	279	13057
77-SULLIVAN	39	2242	0	0	0	0	39	2242
78-SWITZERLAND	97	4756	17	1475	31	2331	145	12562
79-TIPPECANOE	54	2216	12	897	6	175	72	3342
80-TIPTON	44	2997	5	723	6	368	55	4089
81-UNION	83	3663	29	1227	18	2469	130	7358
82-VANDERBURGH	38	2804	21	1304	7	1644	66	5753
83-VERMILLION	155	7750	51	2103	12	1059	218	11253
84-VIGO	116	7325	32	2521	31	1720	179	11574
85-WABASH	65	4697	23	2146	11	615	99	7459
86-WARREN	222	10000	17	621	2	395	241	10927
87-WARRICK	116	5970	18	1746	2	372	136	8088
88-WASHINGTON	96	5068	49	1915	4	231	148	7215
89-WAYNE	210	10294	32	1274	8	661	250	12228
90-WELLS	47	2149	39	1714	13	664	99	4529
91-WHITE								
92-WHITLEY								
STATE-WIDE TOTAL	10498	604090	2277	122977	1271	108428	14046	833495

COMPILED 3/68

END OF RECAP

MERPIC

Table C—Estimated Number of Years to Replace County Bridges Using Current Valuations and a 20 Cent Cumulative Bridge Levy shows the estimated number of years for both one-lane bridges and all county bridges. Figure 3 shows by map the estimated number of years to replace the one-lane bridges. Counties that have a low assessed valuation face a real challenge. With counties using the maximum permissible bridge levy (20 cents), there are some 25 counties that will require 100 years or more to replace their one-lane bridges alone; there are three additional counties (Crawford, Jennings, Owen) that will require more than 200 years to replace their one-lane bridges.

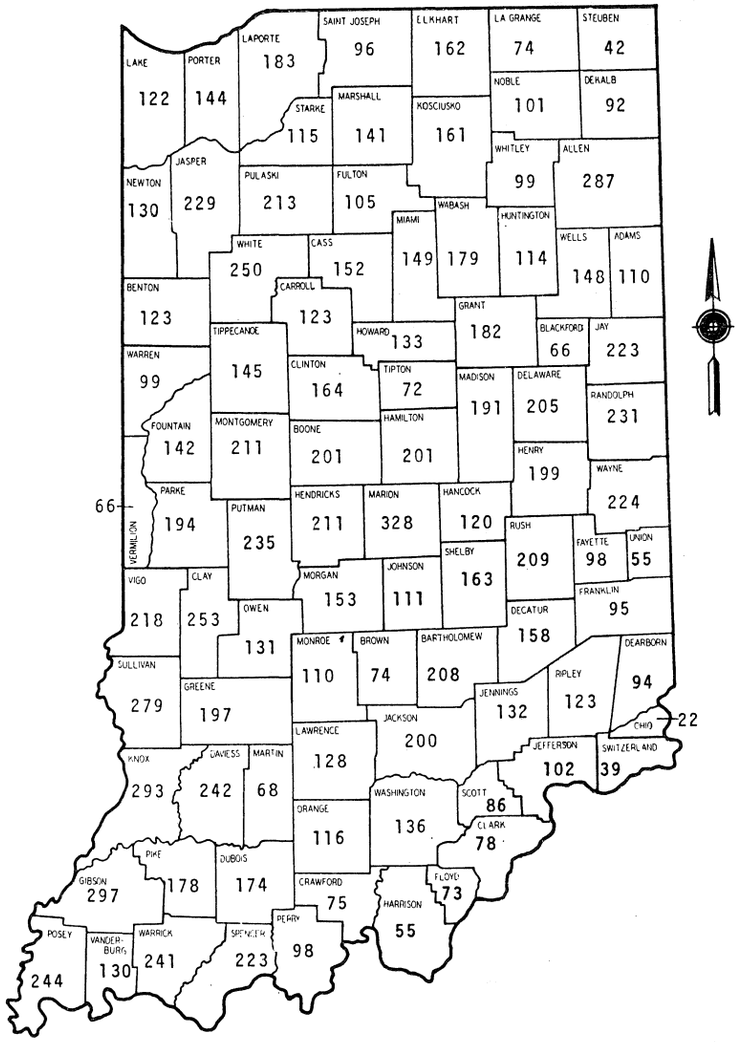


Fig. 1. Number of Bridges. Each number shown includes all bridges on a county road system plus city bridges not on the state highway system. State total is 14,046 bridges.

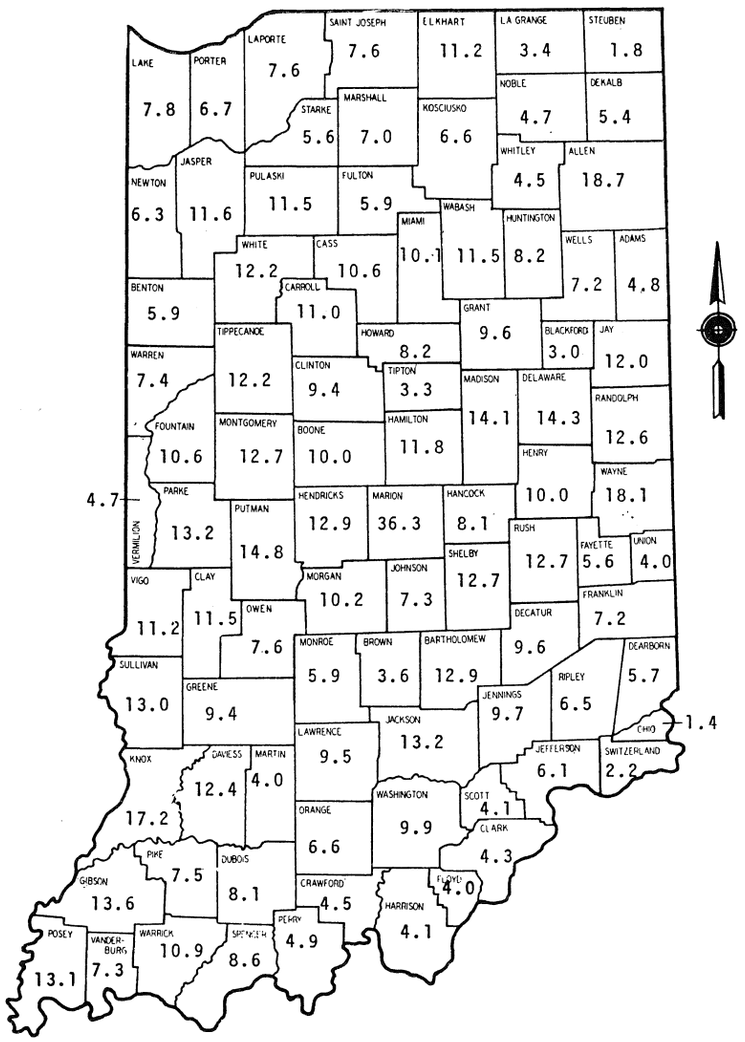


Fig. 2. Estimated Replacement Cost for Existing County Bridges. Map figures indicate millions of dollars. State total is $833.4 million.

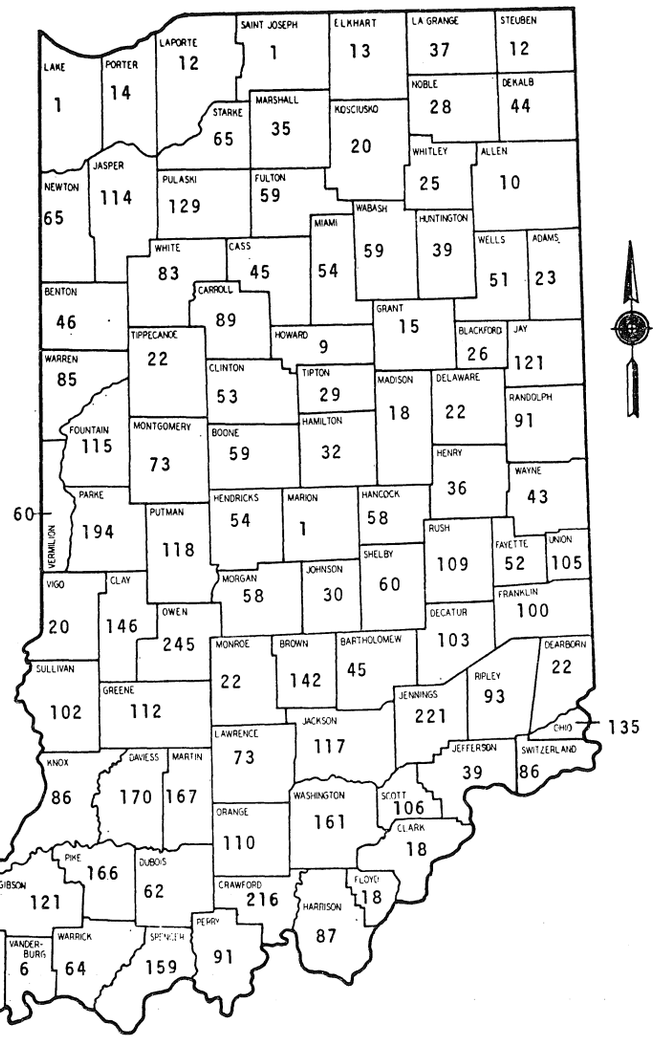


Fig. 3. Estimated Number of Years to Replace One-Lane Bridges Using Current Assessed Valuations with A 20-Cent Cumulative Bridge Levy.

TABLE C

ESTIMATED NUMBER OF YEARS TO REPLACE COUNTY BRIDGES USING CURRENT ASSESSED VALUATIONS AND A 20-CENT CUMULATIVE BRIDGE LEVY

County	Assessed Valuation 1966-67 ($1000)	Annual Income to CBF w/20¢ Levy	One-Lane Bridges Est. Repl. Cost ($1000)	One-Lane Bridges No. of Yrs. to Repl. w/20¢ Levy	All County Bridges Est. Repl. Cost ($1000)	All County Bridges No. of Yrs. to Repl. w/20¢ Levy
Adams	53014	$106028	2525	23	4871	45
Allen	554621	1109242	11736	10	18784	16
Bartholomew	118063	236126	10846	45	12917	54
Benton	42064	84128	3891	46	5930	70
Blackford	27660	55320	1480	26	3062	55
Boone	62408	124816	7423	59	10038	80
Brown	10170	20340	2900	142	3689	181
Carroll	44856	89712	8042	89	11067	123
Cass	80522	161044	7256	45	10630	66
Clark	97997	195994	3689	18	4359	22
Clay	35536	71072	10413	146	11581	162
Clinton	65647	131294	6966	53	9446	71
Crawford	9277	18554	4026	216	4564	245
Daviess	34094	68188	11616	170	12469	182
Dearborn	92283	184566	4068	22	5736	31
Decatur	38612	77224	7971	107	9619	124
DeKalb	50583	101166	4503	44	5434	53
Delaware	197669	395338	9088	22	14393	36
Dubois	51359	102718	6451	62	8137	79
Elkhart	243456	486912	6576	13	11225	23
Fayette	46508	93016	4842	52	5611	60
Floyd	88533	177066	3338	18	4031	22
Fountain	35699	71398	8276	115	10667	149
Franklin	25463	50926	5137	100	7263	142
Fulton	39846	79692	4771	59	5904	74
Gibson	49776	99552	12130	121	13651	137
Grant	152787	305574	4599	15	9612	31
Greene	37361	74722	8406	112	9496	127
Hamilton	93836	187672	6039	32	11828	63
Hancock	59700	119400	6971	58	8132	68

TABLE C Continued

ESTIMATED NUMBER OF YEARS TO REPLACE COUNTY BRIDGES USING CURRENT ASSESSED VALUATIONS AND A 20-CENT CUMULATIVE BRIDGE LEVY

County	Assessed Valuation 1966-67 ($1000)	Annual Income to CBF w/20¢ Levy	One-Lane Bridges Est. Repl. Cost ($1000)	One-Lane Bridges No. of Yrs. to Repl. w/20¢ Levy	All County Bridges Est. Repl. Cost ($1000)	All County Bridges No. of Yrs. to Repl. w/20¢ Levy
Harrison	23110	46220	4029	87	4159	89
Hendricks	77295	154590	8467	54	12947	83
Henry	91101	182202	6581	36	10078	55
Howard	172059	344118	3383	9	8205	23
Huntington	63139	126278	5006	39	8297	65
Jackson	54614	109228	12838	117	13264	121
Jasper	45667	91334	10470	114	11678	127
Jay	43624	87248	10603	121	12019	137
Jefferson	74067	149214	5954	39	6187	41
Jennings	20940	41880	9259	221	9798	233
Johnson	80046	160092	4892	30	7315	45
Knox	67613	135226	11710	86	17290	127
Kosciusko	111934	223868	4615	20	6661	29
LaGrange	41710	83420	3159	37	3405	40
Lake	1036401	2072802	2233	1	7860	3
LaPorte	213189	426378	5384	12	7641	17
Lawrence	54731	109462	8057	73	9579	87
Madison	219847	439694	8199	18	14189	32
Marion	1515427	3030854	4656	1	36378	12
Marshall	78553	157106	5588	35	7089	45
Martin	11505	23010	3865	167	4081	177
Miami	57664	115328	6330	54	10156	88
Monroe	99731	199462	4553	22	5904	29
Montgomery	78237	156474	11448	73	12793	81
Morgan	62148	124296	7225	58	10297	82
Newton	36283	72566	4721	65	6388	88
Noble	56791	113582	3224	28	4772	42
Ohio	5023	10046	1361	135	1414	140
Orange	24795	49590	5455	110	6615	133
Owen	14037	28074	6895	245	7693	274
Parke	26963	53926	10501	194	13279	246

TABLE C Continued

ESTIMATED NUMBER OF YEARS TO REPLACE COUNTY BRIDGES USING CURRENT ASSESSED VALUATIONS AND A 20-CENT CUMULATIVE BRIDGE LEVY

County	Assessed Valuation 1966-67 ($1000)	Annual Income to CBF w/20¢ Levy	One-Lane Bridges Est. Repl. Cost ($1000)	One-Lane Bridges No. of Yrs. to Repl. w/20¢ Levy	All County Bridges Est. Repl. Cost ($1000)	All County Bridges No. of Yrs. to Repl. w/20¢ Levy
Perry	21294	42588	3891	91	4934	115
Pike	21533	43066	7172	166	7567	175
Porter	177626	355252	5188	14	6703	18
Posey	43388	86776	10648	122	13169	151
Pulaski	37589	75178	9730	129	11570	153
Putnam	47192	94384	11139	118	14842	157
Randolph	61831	123662	11264	91	12698	102
Ripley	32083	64166	6013	93	6504	101
Rush	49005	98010	10727	109	12769	130
St. Joseph	417153	834306	1354	1	7600	9
Scott	18705	37410	3981	106	4117	110
Shelby	67793	135586	8266	60	12756	94
Spencer	26386	52772	8411	159	8666	164
Starke	36069	72138	4744	65	5681	78
Steuben	42566	85132	1026	12	1856	21
Sullivan	49765	99530	10158	102	13057	131
Switzerland	12946	25892	2242	86	2242	86
Tippecanoe	192028	384056	8476	22	12283	31
Tipton	38606	77212	2269	29	3342	43
Union	14226	28452	2997	105	4089	143
Vanderburgh	275814	551628	3663	6	7358	13
Vermillion	23276	46552	2804	60	4778	102
Vigo	190584	381168	7690	20	11253	29
Wabash	61466	122932	7325	59	11574	94
Warren	27521	55042	4697	85	7459	135
Warrick	77351	154702	10000	64	10927	70
Washington	27875	55750	8990	161	9989	179
Wayne	149847	299694	13052	43	18134	60
Wells	49598	99196	5068	51	7215	72
White	61585	123170	10294	83	12228	99
Whitley	42222	84444	2149	25	4529	53

ACTION PROGRAM FOR COUNTY BRIDGES

With the county bridge inventory reports in hand, there is good reason for each board of county commissioners to address itself anew to an action program of county bridge planning, repair and replacement. HERPIC Bulletin No. 6—"Planning and Financing County Bridge Programs" has a section devoted to programming for bridge improvement. The following recommendations are submitted here to give emphasis to the guide lines set forth in HERPIC Bulletin No. 6.

(A) *County Road Classification* is a recommended first step in formulating a comprehensive bridge program. Eventually, county road officials must decide on the relative importance of each county road route through their county. The importance of the road route will usually be a factor in deciding the importance of a particular bridge. The county road classification is basically a method of reducing the importance rating of each road to a planned network of roads having the same relative importance.

"The County Needs Reports" published by the 1967 Indiana Highway Needs Study includes a county map delineating a proposed system of county arterial roads, with the remainder of the county road system classified as local roads. It is recommended that county road officials use the system of county arterial roads recommended by the needs study as a point of beginning.

County road officials should study the county road classifications proposed by the Indiana Highway Needs Study. Such a review may show that the original proposal is adequate and satisfactory; on the other hand county road officials may find it desirable to change, expand, or reduce the network or arterial roads proposed by the needs study. In any event, county road officials should adopt a system of county arterial roads for their particular county. This is a necessary first step to good county road planning and management. It is necessary for all phases of county road planning and is especially needed for planning county bridge programs.

(B) *Condition Rating and Priority Rating* of all county bridges should be a continuing program carried out by the county highway engineer. County bridges, particularly the older ones, should be inspected annually and a safe-load rating made for each structure. Field inspection immediately following seasonal floods is important for older structures since their condition can deteriorate quickly.

A method of rating bridges for condition is presented in HERPIC Bulletin No. 6. This method, or some similar rating procedure, should be used to rate the condition of each structure and thereby establish a

priority for replacement or repair. Without a condition rating and a priority rating for each structure, county road officials have no meaningful way to measure their immediate or long-range needs for bridge funds.

It is also recommended that a separate priority list for bridge repair and replacement be drawn up for each category of county road classification, i.e., arterial and local roads. In this way a separate priority determination can be made for each level of road service.

(C) *Financial Plans* for the county bridge replacement and repair programs are of course difficult, mainly because county road officials have pressing demands for improving all categories of county road service. However, the needs for added revenue must be met if these problems are to be solved.

Indiana county road officials currently have three sources of revenue for county bridge programs; these are:

Motor Vehicle Highway Account
Federal Aid Secondary (FAS)
County Taxation
- Cumulative Bridge Fund
- General Fund
- Bond Issues

In working out a financial plan for bridge replacement and repair, county road officials should review the availability of funds from all possible sources. Unless some new source of revenue is developed, the cumulative bridge fund plus FAS funds will probably continue as the principal financial support for county bridge improvement programs. However, the FAS funds are limited to some $3.5 million annually and are allocated among the 92 counties. Therefore at the present level of funding, FAS funds cannot be expected to be a major source of revenue for new bridge construction.

With respect to the cumulative bridge fund, there are only 10 or 12 counties that are using the maximum permissible levy of 20 cents therefore county road officials with a low bridge levy should give serious consideration to setting a higher bridge levy for their county. In addition, serious consideration should be given to MVHA funds for short term needs, especialy for emergency repair and to bond issues for long-term needs, especially major river crossings and structures serving the county arterial road system.

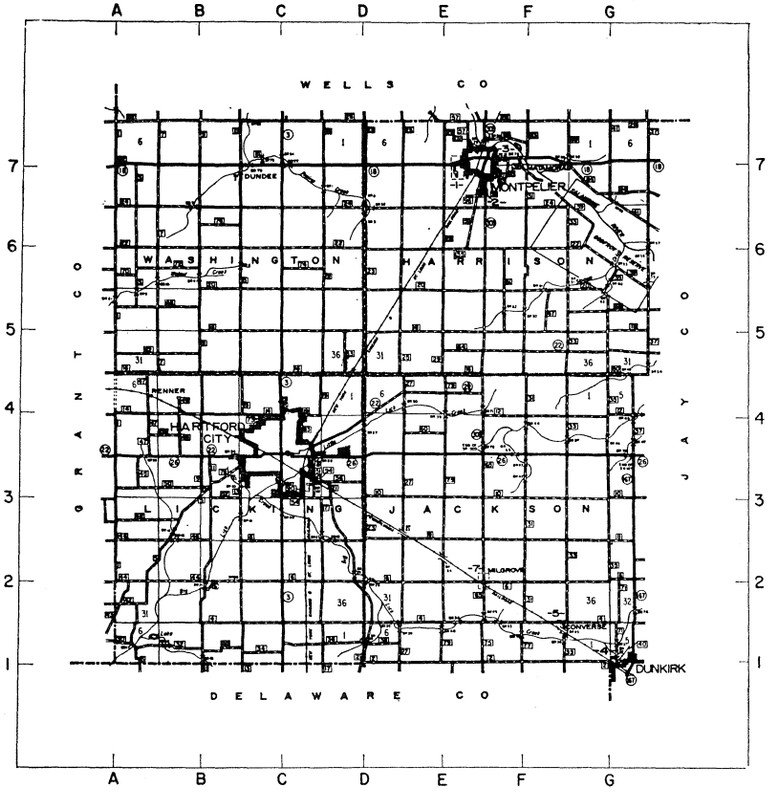
CLOSURE

The county bridge inventory listing and summary should prove to be a useful planning tool to county road officials. The inventory in-

formation has hopefully provided a better insight into county bridge problems in all the 92 counties. And to this end, the inventory should be helpful to commissioners in generating local interest and support for a more vigorous bridge construction and repair program.

APPENDIX

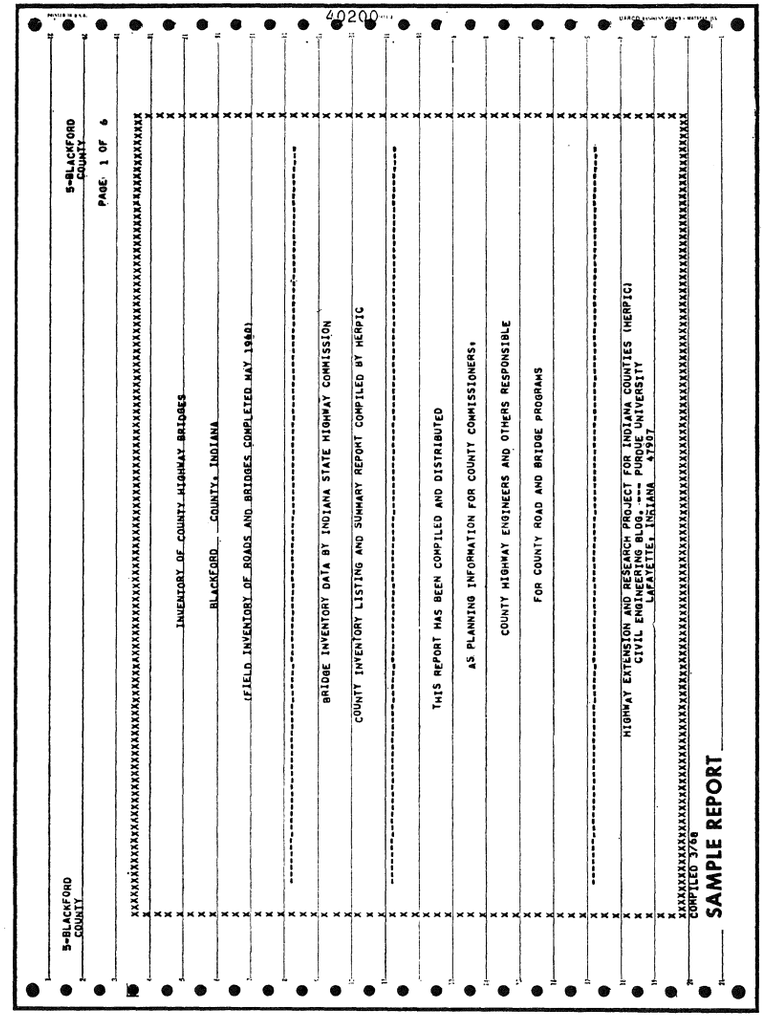
The appendix that follows includes a sample county report and road inventory key map for Blackford County, Indiana.



ROAD INVENTORY KEY MAP
BLACKFORD COUNTY
INDIANA
PREPARED BY
DIVISION OF PLANNING
INDIANA STATE HIGHWAY COMMISSION
IN COOPERATION WITH
U. S. DEPARTMENT OF COMMERCE
BUREAU OF PUBLIC ROADS

SCALE—MILES

INSET SCALE — FEET



EXPLANATORY NOTES *** EXPLANATORY NOTES *** EXPLANATORY NOTES

NO.1 -- PRINTED INVENTORY LISTING AND SUMMARY OF COUNTY HIGHWAY BRIDGES INCLUDES BRIDGES IN UNINCORPORATED AREAS AND ON THE COUNTY HIGHWAY SYSTEM. PLUS(*) A SUPPLEMENTAL LISTING OF CITY BRIDGES NOT ON STATE HIGHWAY SYSTEM. (GRADE SEPARATIONS NOT INCLUDED)

NO.2 -- BLANK SPACES FOR FUNCTIONAL CLASSIFICATION OF COUNTY ROADS AND CONDITION RATING OF COUNTY BRIDGES TO BE COMPLETED BY COUNTY HIGHWAY ENGINEER.

NO.3 -- ESTIMATED SAFE LOAD IS ONLY A VISUAL ESTIMATE MADE AT THE TIME OF FIELD INVENTORY ----- CONDITION INSPECTION AND SAFE LOAD RATING SHOULD BE MADE ANNUALLY BY COUNTY HIGHWAY ENGINEER.

NO.4 -- GUIDELINE PROCEDURES FOR CONDITION RATING OF COUNTY BRIDGES ARE SETFORTH IN HERPIC BULLETIN NO.8--PLANNING AND FINANCING COUNTY BRIDGE PROGRAMS.

NO.5 -- COUNTY ROAD OFFICIALS SHOULD ALSO CONSULT THE INVENTORY DATA ON ROADS AND STREETS AVAILABLE THRU THE PLANNING DIVISION, INDIANA STATE HIGHWAY COMMISSION.

04010

LEGEND OF INVENTORY ROUTES*

C =COUNTY ROAD
S =STATE HIGHWAY
U =U.S. ROUTE
I =INTERSTATE

*(C- -0) USED FOR COUNTY ROUTE IN UNINCORPORATED PLACE OR TOWN

LEGEND OF STRUCTURAL MATERIALS

C =CONCRETE
S =STEEL
SB =STONE BLOCK
W =WOOD

LEGEND OF BRIDGE TYPES**

BL	=BEAM LEG
BL-KB	=BEAM LEG WITH KNEE BRACING
BRKA	=BRICK ARCH
BSA	=BOWSTRING STEEL ARCH
CBT	=CAMEL BACK TRUSS
CRCG	=CONCRETE REINFORCED CONCRETE GIRDER
DPG	=DECK PLATE GIRDER
DT	=DECK TRUSS
FS	=FLAT SLAB
HTPG	=HALF THRU PLATE GIRDER
LCBT	=LOW CAMEL BACK TRUSS
LPT	=LOW PRATT TRUSS
LPTFS	=LOW PRATT TRUSS FULL SLOPE
LPTHH	=LOW PRATT TRUSS HALF HIP
LWT	=LOW WARREN TRUSS
LWTV	=LOW WARREN TRUSS WITH VERTICALS
MPA	=MULTI PLATE ARCH
PG	=PLATE GIRDER

LEGEND OF BRIDGE TYPES**

RB	=ROLLED BEAM
RCA	=REINFORCED CONCRETE ARCH
RCG	=REINFORCED CONCRETE GIRDER
RCS	=REINFORCED CONCRETE SLAB
SBA	=STONE BLOCK ARCH
TB	=TIMBER BEAM
TBCT	=THRU BURR COVERED TRUSS
THCT	=THRU HOWE COVERED TRUSS
TL	=TRUSS LEG
TPET	=THRU PETIT TRUSS
TPG	=THRU PLATE GIRDER
TPT	=THRU PRATT TRUSS
TPRT	=THRU PRATT TRUSS
TQWT	=THRU QUADRANGULAR WARREN TRUSS
TRCG	=THRU REINFORCED CONCRETE GIRDER
TWHT	=THRU WHIPPLE TRUSS
TWT	=THRU WARREN TRUSS

(*) PREFIX TO COUNTY BRIDGE NO. INDICATES ADDITIONAL SECTION IN BRIDGE STRUCTUME.

**FOR OTHER BRIDGE TYPES CONSULT HERPIC BULLETIN NO.8 -- PLANNING AND FINANCING COUNTY BRIDGE PROGRAMS.

SAMPLE REPORT

COUNTY BRIDGE NO	INVEN ROUTE NO	KEY MAP LOC	FUNCT CLASS	CONDIT RATING	BRIDGE TYPE	LGTH (FT)	HORIZ CLEAR (FT)	VERTI CLEAR (FT)	STRM HGT (FT)	NO OF SPANS	STRUCT SUPER	MATRL SUBST	EST. SAFE LOAD (T)	STREAM NAME
003	C- 15	B-07			RB	24	14.0		6	1	S	C	10	PRAIRIE CRK.
010	C- 7	A-06			RB	34	15.0		12	1	S	C	10	WALNUT CRK.
012	C- 46	B-02			RB	51	17.0		9	1	S	C	15	BR.BIG LICK CRK.
013	C- 8	D-02			TLKB	50	15.0		11	1	S	S	15	BIG LICK CRK.
016	C- 5	B-03			RB	30	15.0		7	1	S	C	15	BR.BIG LICK CRK.
017	C- 5	A-01			TL	70	13.0		13	1	S	S	10	LICK CRK.
019	C- 13	B-03			TL	71	15.0		13	1	S	S	3	BIG LICK CRK.
020	C- 13	B-03			RB	34	17.0		10	1	S	C	10	BR.BIG LICK CRK.
021	C- 11	B-02			TWT	92	14.0	14.0	15	1	S	C	20	BIG LICK CRK.
024	C- 21	D-01			RB	32	16.0		11	2	S	C	10	BR.BIG LICK CRK.
034	C- 4	F-01			LPT	60	13.0		9	1	S	SB+C	10	BIG LICK CRK.
036	C- 4	D-01			RB	31	13.0		10	1	S	C	10	BIG LICK CRK.
039	C- 79	F-03			RB	30	16.0		7	1	S	C	20	LITTLE LICK CRK.
040	C- 79	E-01			RB	34	17.0		11	1	S	C	20	BIG LICK CRK.
047	C- 37	G-04			RB	33	15.0		7	1	S	C	15	DITCH
049	C- 80	G-04			RB	30	17.0		6	1	S	C	12	DITCH
050	C- 31	F-05			RB	25	15.0		6	1	S	C	15	SLOCUM DITCH
052	C- 24	D-06			LPT	45	14.0		9	1	S	C	8	PRAIRIE CRK.
053	C- 39	G-06			BST	64	16.0		10	3	S	C+WD	15	SLOCUM DITCH
054	C- 37	G-05			TL	36	13.0		6	1	S	S	5	DITCH
055	C- 37	G-06			RB	28	15.0		6	1	S	C	20	DITCH
056	C- 37	G-06			TPT	164	15.0	18.0	22	1	S	C	20	SALAMONIE RIV.
057	C- 37	G-06			RCA	106	16.0		18	1	C	C	20	BR.SALAMONIE RIV.
059	C- 41	G-07			RCA	28	16.0		6	1	C	C	15	BR.SALAMONIE CRK.
061	C- 20	F-06			RCG	24	17.0		5	1	C	C	10	SLOCUM DIT.
062	C- 61	F-05			RB	28	15.0		9	1	S	C	10	SLOCUM DT.
078	C- 81	C-07			BSA	50	14.0		9	1	S	C	5	PRAIRIE CRK.
082	C- 26	C-07			TL	60	14.0		10	1	S	S	15	BR.PRAIRIE CRK.
090	C- 6	B-02			SBA	36	16.0		7	2	SB	SB	15	CREEK

04020

SAMPLE REPORT

S-BLACKFORD COUNTY

INVENTORY LISTING OF COUNTY HIGHWAY BRIDGES

(HORIZONTAL CLEARANCE = 18 FT -- 22 FT)

S-BLACKFORD COUNTY

COUNTY BRIDGE NO	INVEN ROUTE NO	KEY MAP LOC	FUNCT CLASS	CONDIT RATING	BRIDGE TYPE	LGTH (FT)	HORIZ CLEAR (FT)	VERTI CLEAR (FT)	STRM HGT (FT)	NO OF SPANS	STRUCT-MATRL SUPER	STRUCT-MATRL SUBST	EST. SAFE LOAD (T)	STREAM NAME
001	C- 19	C-07			RB	36	18.0		6	1	S	C	10	PRAIRIE CRK.
002	C- 15	B-06			RB	29	22.0		9	1	S	C	10	WALNUT CRK.
005	C- 23	D-06			RB	40	18.0		8	1	S	C	8	PRAIRIE CRK.
007	C- 24	B-06			RB	42	19.0		9	1	S	C	15	BR.PRAIRIE CRK.
009	C- 3	A-05			RB	41	19.0		14	1	S	C	10	WALNUT CRK.
015	C- 11	B-01			RB	24	20.0		6	1	S	C	10	BR.BIG LICK CRK.
023	C- 17	C-03			RB	81	21.0		12	3	S	C	20	BIG LICK CRK.
027	C- 23	D-04			RB	24	18.0		8	1	S	C	20	LITTLE LICK CRK.
028	C- 6	D-02			RB	55	22.0		8	1	S	C	20	BIG LICK CRK.
029	C- 27	D-01			RB	41	18.0		10	1	S	C	20	BIG LICK CRK.
030	C- 27	D-04			RB	39	20.0		9	1	S	C	20	LITTLE LICK CRK.
031	C- 71	G-01			RB	41	20.0		7	1	S	C	15	BIG LICK CRK.
032	C- 71	G-01			RB	24	20.0		8	1	S	C	15	BR.BIG LICK CRK.
033	C- 4	F-01			RB	42	19.0		8	1	S	C	20	BIG LICK CRK.
036	C- 33	F-01			RB	29	19.0		7	1	S	C	10	BIG LICK CRK.
037	C- 33	F-04			RB	34	20.0		12	1	S	C	12	DITCH
041	C- 77	E-04			RB	40	20.0		7	1	S	C	20	BIG LICK CRK.
042	C- 31	F-03			RB	24	19.0		6	1	S	BRIC	12	DITCH
043	C- 31	F-04			RB	40	20.0		6	1	S	C	15	DITCH
044	C- 31	F-04			RB	35	20.0		10	1	S	C	8	DITCH
045	C- 65	E-01			RB	36	19.0		11	1	S	C	15	BIG LICK CRK.
046	C- 35	G-04			RB	31	20.0		11	1	S	C	20	DITCH
048	C- 37	G-04			RB	30	20.0		12	1	S	C	15	DITCH
058	C- 69	F-07			RB	28	22.0		6	1	S	C	20	DITCH
060	C- 35	G-06			RB	31	21.0		11	1	S	C	8	BR.SLOCUM DT.
063	C- 35	G-05			RB	23	19.0		8	1	S	C	8	BR.SLOCUM DT.
081	C- 1	A-06			TPG	60	20.0		12	1	S	C	15	WALNUT CRK.

SAMPLE REPORT

S-BLACKFORD COUNTY

INVENTORY LISTING OF COUNTY HIGHWAY BRIDGES

(HORIZONTAL CLEARANCE = MORE THAN 22 FT)

S-BLACKFORD COUNTY

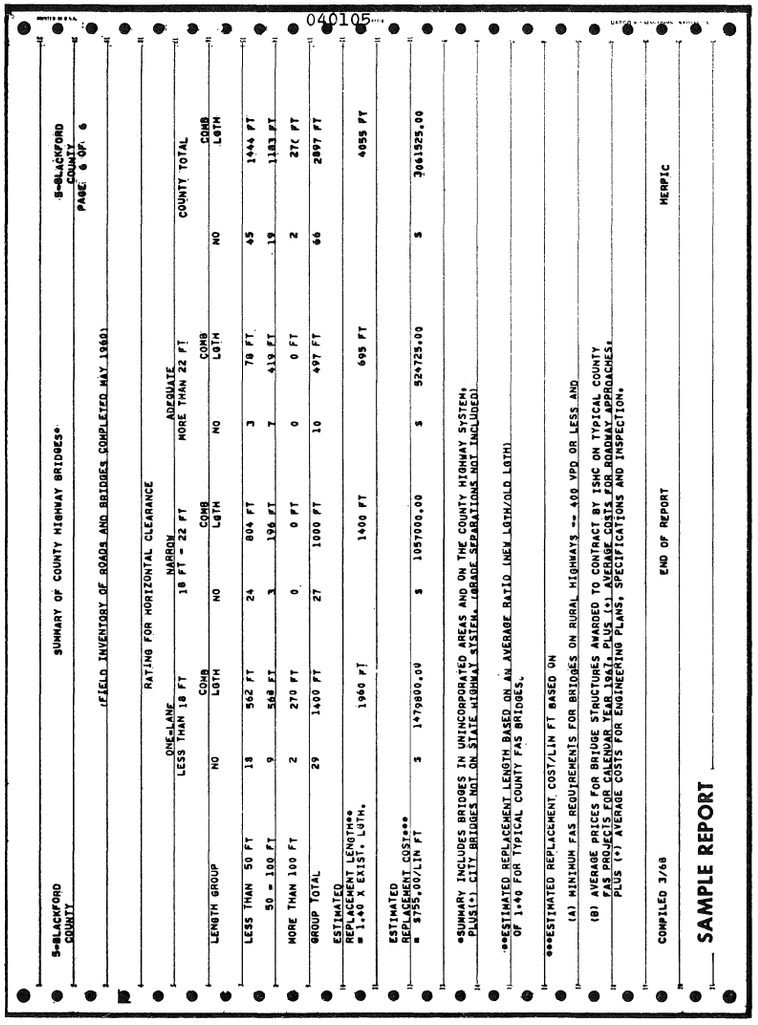
COUNTY BRIDGE NO	INVEN ROUTE NO	KEY MAP LOC	FUNCT CLASS	CONDIT RATING	BRIDGE TYPE	LGTH (FT)	HORIZ CLEAR (FT)	VERTI CLEAR (FT)	STRM HGT (FT)	NO OF SPANS	STRUCT-MATRL SUPER	STRUCT-MATRL SUBST	EST. SAFE LOAD (T)	STREAM NAME
004	C- 9	B-06			RB	31	24.0		13	1	S	C	10	WALNUT CRK.
006	C- 23	D-07			FS	56	24.0		10	3	C	C	20	PRAIRIE CRK.
018	C- 32	B-01			FS	54	24.0		9	3	C	S+C	20	BR.BIG LICK CRK.
022	C- 51	C-03			FS	68	38.0		13	3	C	C	20	LITTLE LICK CRK.
025	C- 21	D-02			FS	68	24.0		11	3	C	C	20	BIG LICK CRK.
051	C- 33	F-06			FS	54	24.0		12	3	C	C	20	SLOCUM DITCH
093	C- 78	B-03			FS	23	24.0		8	1	C	C	20	BR.BIG LICK CRK.

CITY BRIDGES NOT ON STATE HIGHWAY SYSTEM.

HARTFORD CITY

002	JEFFERSON ST.				RB	54	41.0		9	1	S	C	15	BR.BIG LICK CR.
003	MONROE ST.				RB	65	35.0		8	1	S	C	15	BR.BIG LICK CR.
005	WILLMAN RD.				RB	24	33.0		11	1	S	C	15	LT.LICK CR.

SAMPLE REPORT



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S-BLACKFORD COUNTY — SUMMARY OF COUNTY HIGHWAY BRIDGES* — S-BLACKFORD COUNTY — PAGE 6 OF 6

(FIELD INVENTORY OF ROADS AND BRIDGES COMPLETED MAY 1960)

RATING FOR HORIZONTAL CLEARANCE	ONE-LANE		NARROW		ADEQUATE		COUNTY TOTAL	
	LESS THAN 18 FT		18 FT - 22 FT		MORE THAN 22 FT			
LENGTH GROUP	NO	COMB LGTH	NO	COMB LGTH	NO	COMB LGTH	NO	COMB LGTH
LESS THAN 50 FT	18	562 FT	24	804 FT	3	78 FT.	45	1444 FT
50 - 100 FT	9	568 FT	3	196 FT	7	419 FT	19	1183 FT
MORE THAN 100 FT	2	270 FT	0	0 FT	0	0 FT	2	270 FT
GROUP TOTAL	29	1400 FT	27	1000 FT	10	497 FT	66	2897 FT

ESTIMATED REPLACEMENT LENGTH** = 1.40 X EXIST. LGTH. — 1960 FT — 1400 FT — 695 FT — 4055 FT

ESTIMATED REPLACEMENT COST*** = $754.20/LIN FT — $ 1479800.00 — $ 1057000.00 — $ 524725.00 — $ 3061525.00

*SUMMARY INCLUDES BRIDGES IN UNINCORPORATED AREAS AND ON THE COUNTY HIGHWAY SYSTEM; PLUS(+) CITY BRIDGES NOT ON STATE HIGHWAY SYSTEM (GRADE SEPARATIONS NOT INCLUDED)

**ESTIMATED REPLACEMENT LENGTH BASED ON AN AVERAGE RATIO (NEW LGTH/OLD LGTH) OF 1.40 FOR TYPICAL COUNTY FAS BRIDGES.

***ESTIMATED REPLACEMENT COST/LIN FT BASED ON

(A) MINIMUM FAS REQUIREMENTS FOR BRIDGES ON RURAL HIGHWAYS -- 400 VPD OR LESS AND

(B) AVERAGE PRICES FOR BRIDGE STRUCTURES AWARDED TO CONTRACT BY ISHC ON TYPICAL COUNTY FAS PROJECTS FOR CALENDAR YEAR 1967, PLUS (+) AVERAGE COSTS FOR ROADWAY APPROACHES, PLUS (+) AVERAGE COSTS FOR ENGINEERING PLANS, SPECIFICATIONS AND INSPECTION.

COMPILED 3/68 — END OF REPORT — HERPIC

SAMPLE REPORT

HERPIC PUBLICATIONS AVAILABLE ON REQUEST

ENGINEERING BULLETINS

County Highway Series

No. 1 *Dust Control on Unpaved Roads* (20 pages)
No. 2 *Roadside Weed and Brush Control with Chemicals* (34 pages)
No. 3 *County Subdivision Control: Model Ordinance with Discussion* (46 pages)
No. 4 *Principles of Highway Drainage and Erosion Control* (65 pages)
No. 5 *An Analysis of Traffic Accidents on County Roads* (26 pages)
No. 6 *Planning and Financing County Bridge Programs* (66 pages)
No. 7 *Minor Maintenance of County Bridges* (44 pages)
No. 8 *County Bridge Painting* (49 pages)
No. 9 *Annual Travel on County Highways of Indiana* (22 pages)
No. 10 *Inventory of Indiana County Bridges* (27 pages)

HERPIC REPORTS

Better County Roads

1-61 *Mineral Aggregate Materials for County Road Construction* (4 pages)
2-61 *Sizes and Gradings of Aggregates for Road Construction* (4 pages)
3-61 *Bituminous Materials for County Road Construction* (4 pages)
4-61 *Cumulative Bridge Funds for Construction and Repair of County Bridges* (4 pages)
5-61 *Cumulative Bridge Funds—Questions and Answers on Establishment and Use* (4 pages)

ALSO

Handbook of Facts and Figures on Indiana County Roads—including Directory of Indiana County Highway Departments (Information piece—50 pages)
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HERPIC
Civil Engineering Building
Purdue University
Lafayette, Indiana 47907

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